SWINE SANITATION PROJECT

At

MOULTRIE, GEORGIA

* * * * *

Zoological Division, Bureau of Animal Industry

And

Swift and Company

PROJECT NO. 1

Also, necropsies for Tifton and Quincy sanitary hogs attached.

P. O. Drawer 231
Moultrie, Georgia
April 21, 1941

Chief, Bureau of Animal Industry
Washington, D. C.

Attention: Dr. Benjamin Schwartz

Dear Sir:

Attached you will find report on Swine Sanitation Project at Moultrie, Georgia.

Respectfully,

Leonard E. Swanson
Inspector in Charge

LES:RP

encl.

P. O. Drawer 231
Moultrie, Georgia
April 21, 1941

Mr. W. V. Wahmann, Manager
Swift and Company
Moultrie, Georgia

Dear Mr. Wahmann:

I am mailing you a copy of report submitted to Washington on the Swine Sanitary Project set up by Swift and Company and this office, for the years 1939-1940.

Respectfully,

Leonard E. Swanson
Inspector in Charge

LES:RP

encl.

SWINE SANITATION PROJECT

At

MOULTRIE, GEORGIA

* * * * *

Zoological Division, Bureau of Animal Industry

And

Swift and Company

PROJECT NO. 1

PURPOSE

To determine the practicability of the swine sanitary (better pig production) methods and its effectiveness for controlling all parasites of swine, together with having an ideal setup for demonstration purposes for livestock men of the South.

EFFECTIVE DATES

Begun - January 1, 1939

Completed - September 30, 1940

INTRODUCTION

In setting up a project of this nature, one must take into consideration the parasites encountered and their life histories. The type of soil, water supply, and climate play a very important role in parasitic diseases of swine; this applies more particularly to the semi-tropical area of the South, where this project was launched. The parasites encountered in the South are of two classes, those requiring no

intermediate host or direct infectors, and those which require an intermediate host or indirect infectors, to complete their life cycle. Ascarids, whip worms, nodulars and red stomach worms need no intermediate host but depend on the pigs swallowing the infective eggs (ascarids) or the larvae. Kidney worms need no intermediate host; the larvae which hatches from the egg penetrates the broken or unbroken skin or is swallowed with contaminated feeds or water. The thick stomach worms require an intermediate host, dung beetles, which swallow the worm eggs with the manure of infested swine and transmit the parasites when swine eat the infested beetles. This parasite will be difficult to control, as these beetles feed on manure and fly from one infested area to another, and swine sanitation will have little effect from a control standpoint. Thorn head worms require the May beetle larvae or June bugs, commonly known as white grubs, to complete their life cycle. The eggs hatch in the bodies of the grubs and develop to a stage that is infective to swine. Swine that eat these infested grubs become infested with thorn head worms. Ringing the hogs to prevent rooting, as well as keeping pigs out of freshly plowed fields, is the only means of control.

Lung worms require an intermediate host - earthworms - to complete their life cycle and can be controlled by swine sanitation.

The eggs of all these parasites are susceptible to direct sunlight, their natural enemy; therefore, in this project the bare strip was employed, together with controlled water supply. It has been observed that the greater percentage of feces and urine is passed around the feeding, watering, and bedding places, and along the fence rows. Consequently, these units were kept on bare ground, thereby giving the direct sun an opportunity to kill the eggs, and a bare strip was maintained around all pastures and fields for the same purpose. The sows were fed in a separate pen and kept there for two hours, where they usually had a bowel passage and urinated following feeding. The pigs were not allowed in these pens and could not become infested from this source. Furthermore, the pigs ate from a self-feeder, which excluded the sows at all times.

MATERIALS AND METHODS

Through the cooperation of Swift and Company, Moultrie, Georgia, we received the use of a 5-acre tract of land, 300 yards north of the Government office, and running parallel with the Moultrie-Sylvester highway. Swift and Company furnished the fencing, equipment, feeds, breeding stock, and labor necessary to set up and operate the project.

The equipment consisted of "A" type farrowing houses (see Fig. 4); sanitary watering troughs (Fig. 9); panels for enclosing the individual farrowing houses, pig creeps and sow feeding pens (Figs. 3 and 5); hog oilers (Fig. 8); and oil for greasing

same; plows, shovels, rakes, axes, and plows necessary in the operation of the project. Diagramatic sketches of all the units necessary for efficient operation of this project are attached. (See pages 19, 20, 21, and 22.)

Four purebred sows and one boar were purchased for this project. The sows were bred so as to farrow in the fall and spring, giving two litters a year per sow.

The 5-acre plot was enclosed with a 40 inch hog wire fence, and then divided into 5 equal plots of one acre each. These lots were plowed with a turn plow, harrowed, and seeded in the fall and spring. The fall seeding was oats, and in the spring we planted cow peas, velvet beans and cat tail millet, to supply the green grazing for the sows, sows and pigs, and pigs when weaned. A 2 to 3 foot bare strip was maintained along the fences all around all lots. Each lot was provided with a rubbing post with a horizontal pole, both post and horizontal piece being wrapped with burlap bags, saturated with crank case oil, for the prevention of lice on sows and pigs.

Farrowing lots Nos. 1 and 2 were maintained for the sows and their pigs during the suckling period. These lots were used over and over again but were plowed and reseeded before using again. A 20 to 30 foot bare strip was provided on the side of the lot covered by the "A" shaped hog houses and for pens for feeding sows and pigs, and for sanitary water supply. All equipment was portable and moved from lot to lot.

as needed.

Two to three days prior to farrowing, the sows were moved into the farrowing lot and confined to their individual "A" type house, which was enclosed by a moveable panel fence. The sows were hand-fed shelled corn, tankage, and minerals, except on the day before farrowing, they were given a light bran or short slop. After farrowing, the sows were fed in the sow feeding pens (Fig. 2), which excluded the pigs. When the pigs were 7 to 10 days old, the panels were removed from the houses, the pigs taught to feed from the pig creeps (Fig. 3), where they could enter at will, but excluded the sows. In this creep, they ate shelled corn, tankage, minerals, and charcoal, from a self-feeder. At the ages of 6 to 7 weeks, the pigs were vaccinated for hog cholera, and all boars were castrated. The sows and pigs grazing green oats or oat tail millet in the open lot. The pigs were weaned at 8 to 9 weeks of age. The sows were placed back in the sow lots, while the pigs were moved to the pig lots 2 or 4, where they had access to green grazing, and fed from a self-feeder, containing shelled corn, tankage, and minerals. The pigs were kept in these lots until they reached 120 to 130 pounds, when they were moved to the fattening floor. The fattening pen was a 20-foot square concrete floor, provided with a concrete self-feeder for soaked corn. They also had access to a self-feeder, containing tankage and minerals. When these pigs reached

No. 1 market weights (180 to 240 pounds), they were slaughtered. Each carcass was carefully examined for parasitic diseases, and each set of viscera was examined by the usual technique of screening the contents of the gastro intestinal tract for all parasites.

Lot No. 5 was designated as the sow and boar pasture, and no pigs were allowed in same. The sows were placed in this lot at time of weaning the pigs, re-bred, and hand-fed shelled corn, tankage, and minerals. They had access to green grazing throughout their gestation period.

At the beginning of this project, each sow and the boar were examined for parasite ova. The fecal examination revealed heavy nodular, ascarid, whip, and light thorn head worm eggs. The urine examination revealed heavy kidney worm infestations.

Except for the sow pasture, we maintained a clean lot, taking care to prevent accumulations of mud holes, rubbish, etc. All feces in the pens were scattered on dry, bare ground.

EXPERIMENTAL DATA

The results obtained from swine sanitation in controlling parasites are tabulated in Table 1. Fifteen litters, averaging 7.9 pigs per litter, were farrowed; 18 pigs and 2 sows died of hog cholera. (These two sows were to have been vaccinated by the

original owner, but apparently had not received the simultaneous treatment.) Twenty-seven other pigs were lost through birth, overlayed and accidents. Out of a total of 116 pigs in 15 litters, only 73 were weaned. Four of these were sold for breeding purposes, and 5 were left on the project when closed, leaving a total of 64 pigs slaughtered and examined for parasites. The 64 pigs slaughtered weighed an aggregate of 12,880 pounds, average live weight of 201 pounds, with a dressing weight of 152 pounds, or a yield of 75.6 per cent. These pigs brought an average of $6.37 per cwt., with a grand total of $851.25. The average age of these 64 pigs was 6 months and 14 days when slaughtered as No. 1 hogs.

The youngest group of pigs to reach the market as No. 1 hogs was a litter of 6 pigs, averaging 198.2 pounds, at 5 months 23 days of age. The oldest pigs to reach market, weights averaged 189 pounds, and were 7 months 17 days old. Five out of the 64 pigs slaughtered were infested with lung worms; however, this could not be attributed to swine sanitation, as this litter got out of the lot and were found rooting in and around a community wash rack, where all the hog trucks and conveyances are required to wash after delivering hogs to the market. They undoubtedly picked up a number of earth worms and become infested. Out of the 64 pigs slaughtered, 50 were free of kidney worms, 10 had one kidney worm spot, one had two spots, one had 5 spots,

one had 7 spots, and one had 11 spots in the liver, giving a total of 78.2 per cent good livers. All kidneys and kidney regions were free of kidney worms (see Table 1).

Sixteen pigs out of the total kill of 64 were free of thick stomach worms, and in no case did the infestation exceed 74 worms, which may be considered a light infection. All 64 pigs were free of the red stomach worm. In this group of pigs, the ascarid infestation was spotted, as 15 pigs were free of ascarids, 26 pigs had from 1 to 3 each, 8 pigs had over 3, and less than 10, while 15 pigs had over 10, one of which had a total of 86 mature and immature ascarids on necropsy. Nine of the 64 pigs were infested with thorn head worms; however, all were free of hook worms. Only 2 pigs of this group were free of nodular worms, whereas the balance of the pigs showed a nodular infestation of from 2 to 3045 each. Thirty-three or 51.5 per cent of these pigs were infested with whip worms. These pigs were not checked for strongyloides intestinal worms. All were free of gullet worms.

Breeding sows and boars should be double treated, using over doses of hog cholera virus and serum. The pigs should be double treated and castrated during the suckling periods, as it is more economical and less injurious to the animals. In the South, the breeding stock should have access to a good mineral mixture of bone meal, lime stone, salt, iron oxide, copper sulphate, and cobbalt. They should be provided

TABLE I - PARASITES FOUND AT NECROPSY IN SANITARY RAISED HOGS UNDER GOVERNMENT SUPERVISION

ANIMAL NO.	NECROPSY								
	LUNG WORMS	STOMACH WORMS[1]	ASCARIDS	THORNHEADS	HOOKS	NODULARS	WHIP	KIDNEY WORMS LIVER Spots	KIDNEY WORMS KIDNEYS
	No.	No.	No.	No.	No.	No.	No.	No.	No.
1	0	53	1	7	0	2	0	0	0
2	0	17	3	0	0	4	0	0	0
3	0	40	0	0	0	9	0	0	0
4	0	74	0	0	0	3	0	0	0
5	0	8	3	0	0	7	1	0	0
6	0	8	0	0	0	8	0	1	0
7	0	25	0	6	0	35	0	1	0
8	0	48	14	1	0	13	0	1	0
9	0	11	3	0	0	76	0	0	0
10	0	0	10	0	0	79	0	0	0
11	0	9	0	0	0	36	1	0	0
12	0	15	0	0	0	13	0	0	0
13	0	3	0	0	0	123	1	0	0
14	0	3	1	0	0	5	0	0	0
15	0	3	3	0	0	0	0	0	0
16	0	86	3	0	0	3045	12	0	0
17	0	2	1	0	0	316	12	0	0
18	0	0	1	12	0	393	12	0	0
19	0	0	3	0	0	1062	14	0	0
20	0	3	0	0	0	695	6	0	0
21	0	28	3	0	0	562	0	0	0
22	0	23	3	0	0	1852	0	0	0
23	0	0	2	0	0	663	14	0	0
24	0	0	5	0	0	16	0	0	0
25	0	8	1	0	0	498	0	0	0
26	0	7	3	0	0	1110	0	0	0
27	0	0	20	0	0	544	3	0	0
28	0	0	17	1	0	190	8	0	0
29	0	2	0	0	0	24	0	0	0
30	0	14	2	0	0	818	0	1	0
31	0	0	3	0	0	328	0	1	0
32	0	1	86	1	0	270	3	1	0
33	0	36	6	1	0	34	0	7	0
34	0	31	10	0	0	226	0	11	0
35	0	32	23	0	0	101	5	1	0
36	0	44	43	0	0	175	1	1	0
37	0	14	1	0	0	53	3	5	0
38	0	0	12	0	0	371	12	0	0
39	0	0	15	0	0	285	16	0	0
40	0	4	9	0	0	125	6	0	0
41	0	15	4	0	0	762	24	0	0
42	0	63	4	1	0	1258	4	0	0
43	0	5	1	0	0	461	19	0	0
44	0	13	13	0	0	313	1	0	0
45	0	0	0	0	0	749	27	0	0
46	0	0	16	0	0	1152	49	0	0
48	0	1	0	0	0	1670	25	0	0
49	0	1	11	0	0	108	35	0	0
50	0	1	6	0	0	552	59	0	0
51	0	3	3	0	0	1001	36	0	0
52	0	0	3	0	0	390	0	0	0
53	H	10	1	0	0	615	5	0	0
54	0	33	19	0	0	848	4	0	0
55	L	44	15	0	0	449	0	1	0
56	L	16	3	1	0	244	0	0	0
57	L	17	6	0	0	331	0	0	0
58	12	0	2	0	0	464	0	2	0
59	0	0	0	0	0	160	0	1	0
60	0	1	0	0	0	208	2	0	0
61	0	6	0	0	0	520	0	0	0
62	0	9	1	0	0	0	0	0	0
63	0	4	1	0	0	264	16	0	0
64	0	1	0	0	0	456	8	0	0

H - Heavy

L - Light

with green grazing the year around.

DISCUSSION

Swine sanitation or better pig production is profitable and controls kidney worms, lung worms, red stomach worms, hook worms, and, to a certain extent, thorn head worms, but does not have a marked control over ascarids and no control over whip, nodular or thick stomach worms. Kidney worms do not appear in the kidney region of pigs under 7 months of age, and if swine sanitation were employed in the South, thereby getting the pigs to market under that age, the kidney worm menace would be controlled, if not eradicated, in a few years. Sows or older hogs should never be run with younger pigs or shoats, and the latter should be kept on clean, cultivated fields, away from swamps, sloughs, creeks and ponds. They should be provided with fresh drinking water, the watering trough so constructed as to prevent wasting of water or creating mud holes or wallows (Fig. 9). The pigs should be doubled treated for hog cholera and castrated about one week prior to weaning time. The treatment for hog cholera, coupled with swine sanitation, will control most of the hog diseases, and most certainly the filth born diseases, such as enteritis, bullnose, flu, mange, and pneumonia.

CONCLUSIONS

1. Swine sanitation is practical and economical.

2. Hogs can be developed to No. 1's at 6 to 7 months of age, relatively free of parasites.

3. The cardinal principals of swine sanitation are:

   a. Sanitation and cleanliness.

   b. Maintain a bare strip around the entire field and over the area covered by the farrowing units.

   c. Feed the sows in a separate enclosure, and do not allow the pigs in same.

   d. Feed the pigs from pig creeps, where they can enter at will but will exclude the sows.

   e. Provide green grazing at all times.

   f. Keep lots free of rubbish, such as boards, sticks, fodder, etc.

   g. Feed mineral in self-feeders.

   h. Provide a rubbing post, wrapped with burlap bags, saturated with crank case oil to control lice.

   i. Keep hogs out of swamps, sloughs, creeks, ponds, and permanent pastures.

ILLUSTRATIONS

SWINE SANITATION IN PICTURES

Fig. 1 - The value of swine sanitation sign as used on this set-up.

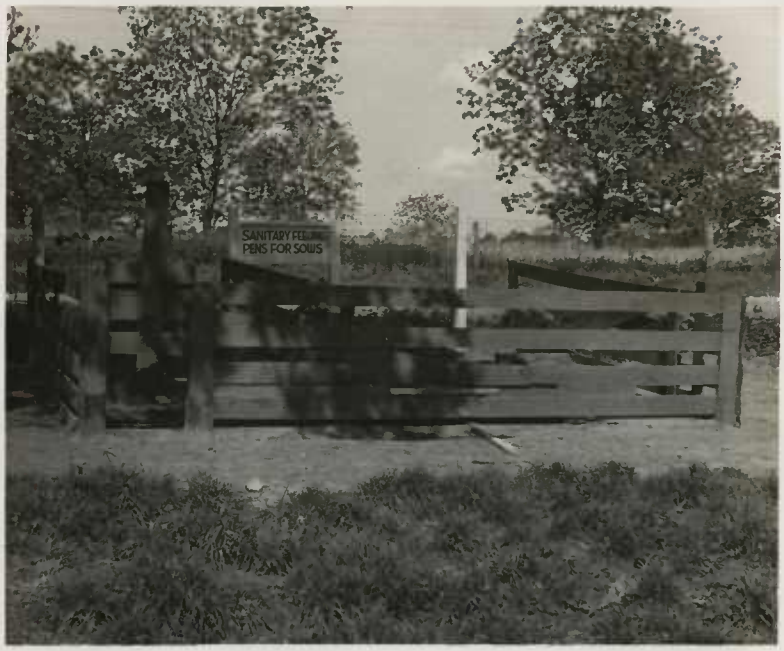


Fig. 2 - Sow feeding pen.

Fig. 3 - Sanitary pig creeps.

Fig. 4 - "A" type farrowing houses, sow feeding pen, and pig creep on bare strip.

Fig. 5 - "A" type farrowing houses, showing panel enclosures.

Fig. 6 - Sanitary sow and litter, on bare strip.

Fig. 7 - Temporary shade for pigs and sows.

Fig. 8 - Hog oiler in action for control of lice.

Fig. 9 - Sanitary watering trough.

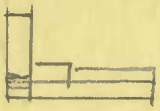
Fig 10 - Sanitary pigs on fattening floor, eating soaked corn from a self-feeder.

Fig. 11 - Sanitary pigs going to the market at 5 months and 21 days age.

Fig. 12 - Note the accumulation of fecal material on the bare strip. This material should not be allowed to accumulate but should be scattered on dry, bare ground, giving the sun access to all parts.

FENCE

WATERING TROUGH

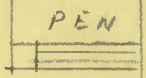


PIG CREEP

20'

HOG OILER

SOW FEED PEN



BARE STRIP

EDGE OF PASTURE

FENCE

3'

BARE STRIP

EDGE OF PASTURE

EDGE OF PASTURE

3'

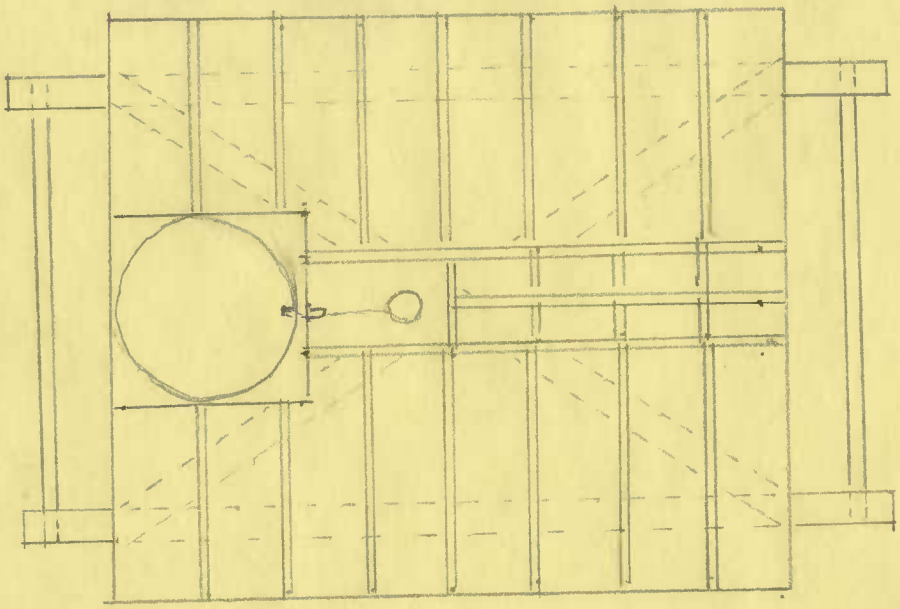
FENCE

BARE STRIP

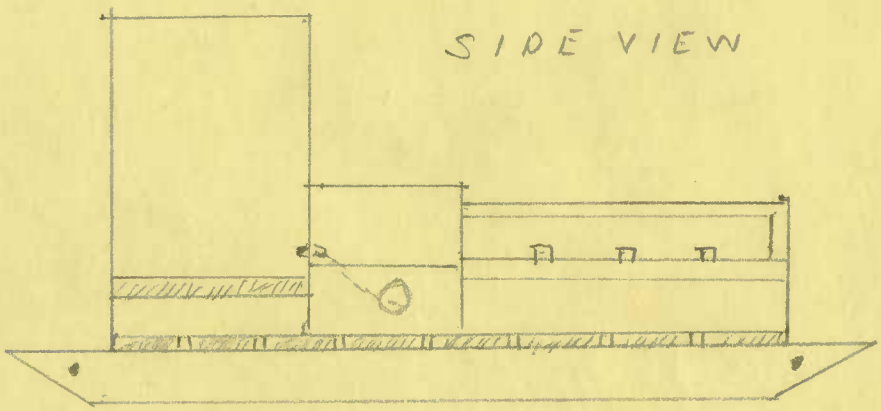
FENCE

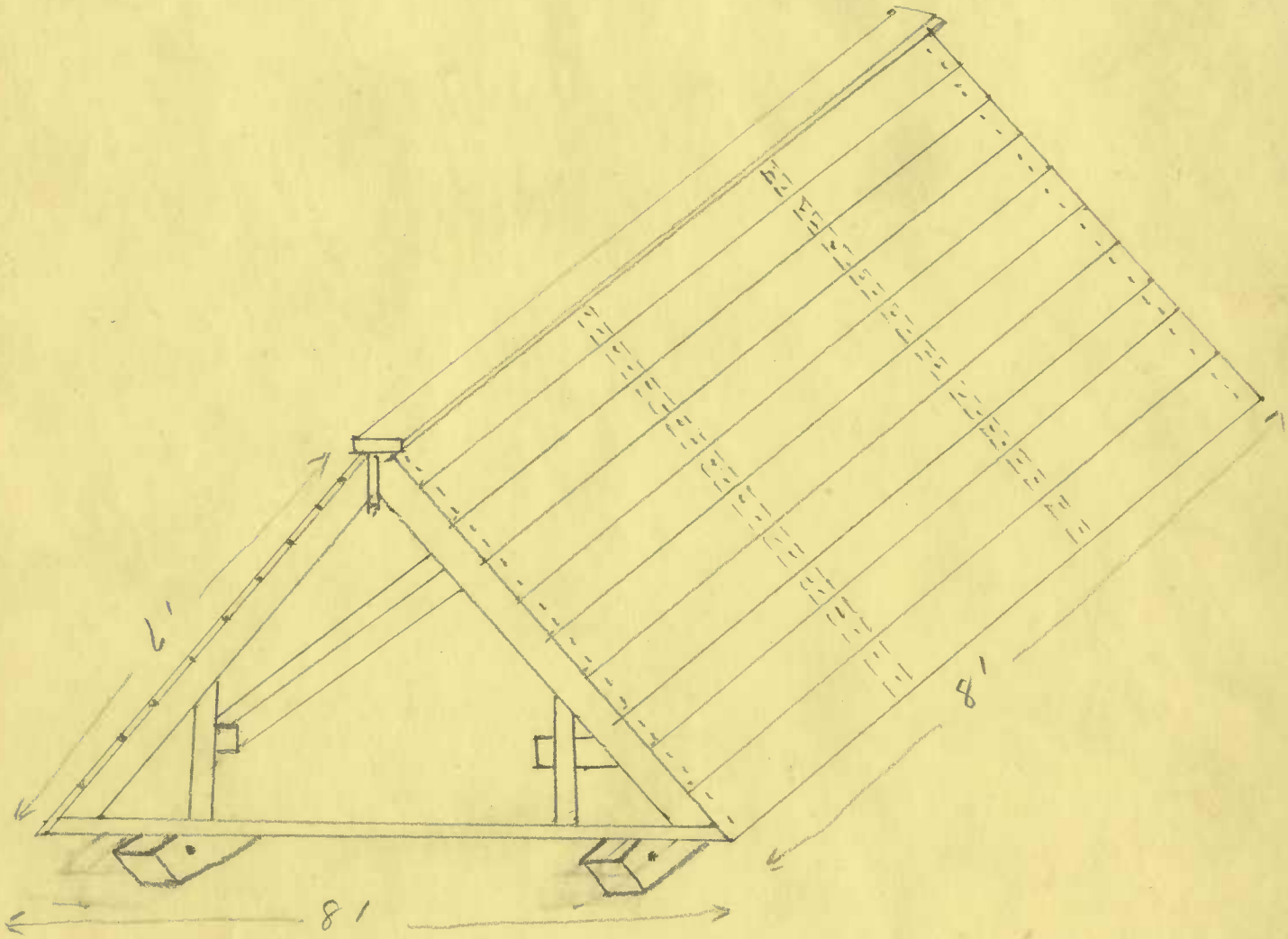
SANITARY WATERING TROUGH

TOP VIEW.

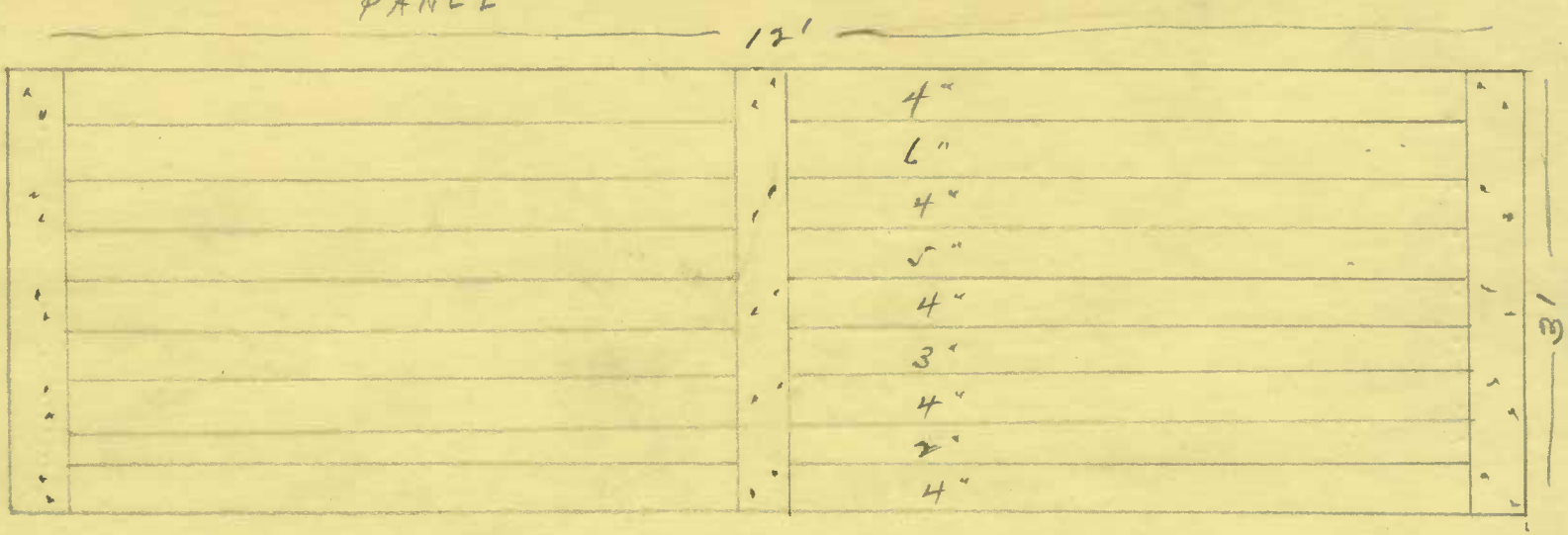


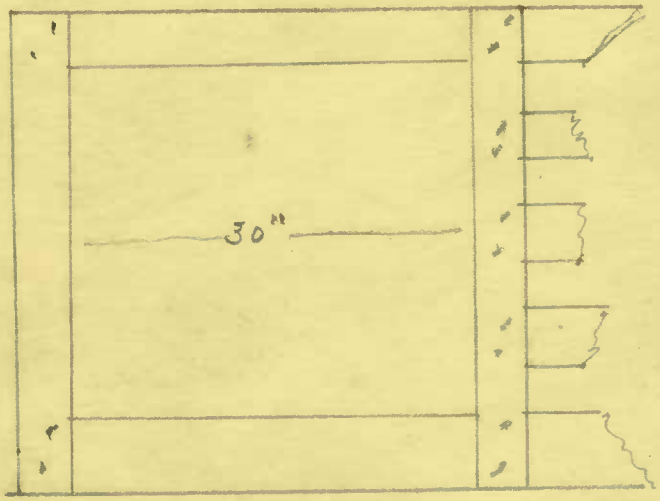
SIDE VIEW



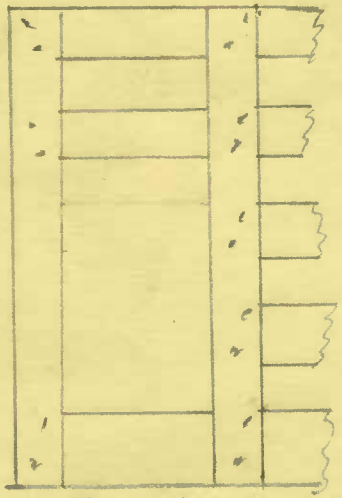


"A" Type house

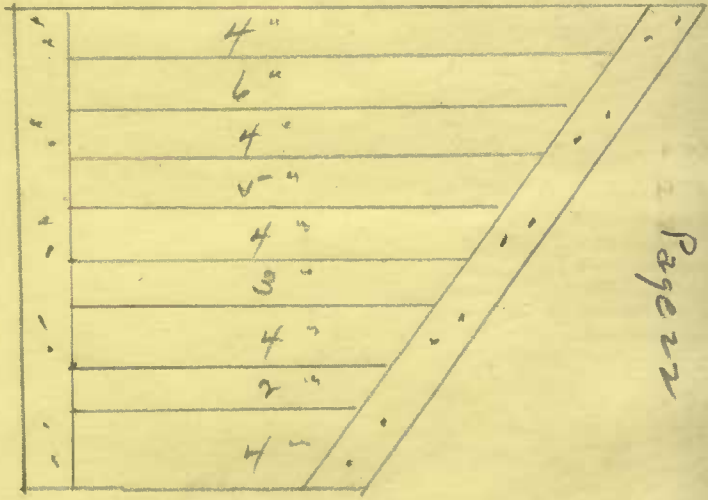




Section of panel showing opening for cow.



Section of panel showing opening in pig creep



Panel section attached to house.

Page 22

Panels and sections used in sanitary set up to control cows + pigs.
For selffeeder and other hog lot equipment see Farmers Bulletin #1490

P. O. Drawer 251
Moultrie, Georgia
April 21, 1941

Chief, Bureau of Animal Industry
Washington, D. C.

Attention: Dr. Benjamin Schwartz

Dear Sir:

Attached herewith you will find a table showing the parasites found at necropsy of sanitary hogs raised at Coastal Plains Experiment Station, Tifton, Georgia, and the North Florida Experiment Station, Quincy, Florida. This table is self-explanatory, and we are submitting it to you on its face value.

I believe that both of these experiment stations have done a very good job of raising hogs on the swine sanitation, better pig production plan.

You will note that only two pigs out of a group of 577 showed lung worm infestation, and that none were infested with thorn head worms or hook worms, also that only 12 showed kidney worms in the kidney or kidney regions. However, 261 head revealed kidney worm larvae in the livers. Furthermore, their whip worm infestation was lighter than was found in our sanitary pigs. You will also note that swine sanitation has very little control on ascarids, nodular worms, and thick stomach worms. No Hyostrongylus rubidus or red stomach worms were found in any of these pigs.

Respectfully,

Leonard E. Swanson

Leonard E. Swanson
Inspector in Charge

LES:RP
encl.

CC- Mr. B. L. Southwell
Tifton, Georgia

CC- Mr. J. D. Warner
Quincy, Florida

TABLE 1 - PARASITES FOUND AT NECROPSY IN SANITARY RAISED HOGS AT TIFTON AND QUINCY1/

ANIMALS2/		NECROPSY									
	CHECKED									KIDNEY WORMS	
	FOR ALL	LUNG	STOMACH						LIVERS	
IN LOT	PARASITES	WORMS	WORMS3/	ASCARIDS	THORN HEADS	HOOKS	NODULARS	WHIPS	Spots	KIDNEYS
No.	No.	No.	No.	No.	No.	No.	No.	No.	No.Head	No.
39	1	0	3	0	0	0	275	2	16	0
	1	0	133	87	0	0	56	0		
21	0	0	--	--	--	--	--	--	17	0
28	0	0	--	--	--	--	--	--	21	5
7	0	0	--	--	--	--	--	--	4	0
14	0	0	--	--	--	--	--	--	10	0
31	1	0	18	0	0	0	296	0	13	2
	1	0	93	16	0	0	1046	3		
33*	1	0	0	15	0	0	736	2	22	0
	1	0	3	3	0	0	120	0		
	1	0	8	6	0	0	772	0		
18	0	0	--	--	--	--	--	--	10	1
20	1	0	21	1	0	0	48	2	8	0
	1	0	55	37	0	0	643	1		
	1	0	2	5	0	0	58	1		
17	1	0	144	1	0	0	243	1	0	0
	1	0	10	0	0	0	14	0		
	1	0	0	11	0	0	184	0		
14	1	0	197	0	0	0	399	3	12	0
	1	0	196	3	0	0	489	2		
14*	1	0	0	10	0	0	3	0	2	0
	1	0	0	3	0	0	4	0		
12	1	0	7	16	0	0	577	0	0	0
	1	0	79	3	0	0	61	4		
6	0	0	--	--	--	--	--	--	4	0
7	0	0	--	--	--	--	--	--	3	0
24	1	0	31	2	0	0	528	4	10	0
	1	0	21	6	0	0	76	4		
	1	0	127	8	0	0	1007	16		
24	0	0	--	--	--	--	--	--	7	0
29	0	0	--	--	--	--	--	--	26	1
15	0	0	--	--	--	--	--	--	10	0
4	1	0	0	4	0	0	348	0	4	0
	1	0	1	1	0	0	52	0		
	1	0	26	9	0	0	7	0		
	1	0	0	5	0	0	150	0		
25	0	0	--	--	--	--	--	--	5	0
17	1	0	4	8	0	0	206	0	10	0
	1	0	8	2	0	0	127	87		
30*	1	0	0	16	0	0	77	0	12	3
	1	0	0	5	0	0	736	0		
	1	0	0	0	0	0	2866	0		
43	1	9	7	6	0	0	197	8	14	0
	1	0	3	46	0	0	101	1		
	1	60	12	31	0	0	1648	0		
34	1	0	X	30	0	0	X	0	0	0
	1	0	X	0	0	0	X	0		
20*	1	0	0	0	0	0	X	0	10	0
	1	0	0	1	0	0	X	0		
	1	0	0	0	0	0	X	0		
31*	0	0	--	--	--	--	--	--	11	0
577	39	69	1189	397	0	0	14150	141	261	12

1/ These two State experiment stations were following swine sanitation, and this office cooperated in making necropsies and suggestions, for the years 1939 and 1940.

2/ Two or three sets of viscera were selected at random on kill and examined for all parasites, while the entire lot was checked for lung worms and kidney worms.

3/ Includes Ascarops strongylina and Physocephalus sexaletus.

* Quincy station hogs.

X Many worms (not counted).

TIFTON AND QUINCY HOGS

CONSOLIDATED INFORMATION FROM TABLE 1

Total number hogs killed	577
Total number livers examined	577
No. livers free of kidney worms and spots	316
Per Cent livers free of kidney worms and spots	54.7
Number livers infested	261
Per cent of livers infested	45.2
Number sets viscera examined	39
Number infested with ascarids	31
Number having 5 and under	14
Number having 10 to 5	7
Number having over 10	10
Number free	8